

BITS, Pilani- Dubai
Dubai International Academic City
First Semester 2009- 2010
Comprehensive Exam (Closed book)

Course No. : BIOT C332
Course Title: Genetics

Maximum Marks: 40
Duration: 3 hours

Date: 26.12.2010

Attempt all the questions in the given sequence

- Q1a. In humans, the allele for normal colour vision is dominant and the allele for colour deficiency is recessive. Both alleles are X-linked. People who cannot detect the difference between certain colours, such as green and red are described as having colour defective vision. A male who has normal vision mates with a female who is heterozygous for normal colour vision. What type of children can they have in terms of these traits, and what is the probability for each type? [4]
- b. What is blunt end ligation? [2]
- c. Diagrammatically explain the Meselson and Stahl Experiment. [4]
- Q2a. What is conditional lethality? Give two examples of the same. [2]
- b. Give the significance of i. Rec A protein, ii. Methylation of DNA, iii. Shine Delgarno region. [6]
- c. What is the significance of V-J joining in antibody diversity? [2]
- Q3a. Lac operon is an inducible operon. Justify. [3]
- bi. why is a λ lysogen resistant to superinfections? [1]
- ii. What is the significance of Xgal? [1]
- c. What are the three major post transcriptional modifications that occur in an eukaryotic cell? [3]
- d. Explain cytoplasmic inheritance in Chlamydomonas. [2]
- Q4a. Define: i. Coefficient of coincidence, ii. Mendel's rule of independent assortment, iii. Split genes [3]
- b. Mendel self fertilized pea plants with round and green peas. In the next generation he recovered the following numbers of peas: 267 round and green peas, 100 round and yellow peas, 105 wrinkled and green peas and 28 wrinkled and yellow peas. What is your hypothesis about the genetic control of the phenotype? Do the data support this hypothesis. (With three degree of freedom and $p > 0.05$, critical chi square = 7.815) [4]
- c. In a certain population of 1000 fruit flies, 640 have red eyes while the remainder has sepia eyes. The sepia eye trait is recessive to red eyes. How many individuals would you expect to be heterozygous for the red eye colour? [3]

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First Semester 2010- 2011

Test 2 (Open book)

Course No. : BIOT C332

Maximum Marks: 20

Course Title: Genetics

Duration: 50 mins

Date: 21.11.2010

Attempt all the questions in the given sequence

Q1. The ability to taste the chemical PTC is determined by a single gene in humans with the ability to taste given by the dominant allele T and inability to taste by the recessive allele t. Suppose two heterozygous tasters (Tt) have a large family.

- a. Predict the proportion of their children who will be tasters and non-tasters. Use a Punnett square to illustrate how you make these predictions. [1M]
- b. What is the likelihood that their first child will be a taster? What is the likelihood that their fourth child will be a taster? [1M]
- c. What is the likelihood that the first three children of this couple will be non-tasters? [1M]

Q2. Hemophilia is a sex-linked trait (see pp. 136 - 137 in your text) where X^H gives normal blood clotting and is dominant to the hemophilia allele X^h .

- a. Give the genotypes of 1) a woman with normal blood clotting whose father had hemophilia and 2) a normal man whose father had hemophilia. [1M]
- b. What is the probability that a mating between these two individuals will produce a child, regardless of sex, that has hemophilia? [1M]
- c. If this couple has a daughter, what is the probability that the daughter will be a carrier of the hemophilia trait? [1M]
- d. What is the probability a daughter would have hemophilia? [1M]
- e. If this couple has a son, what is the probability he will have hemophilia? [1M]

Q3. A three point cross is a better method for gene mapping. Justify. [2M]

Q4. What is a selective media? Mention its two important advantages over enriched media. [3M]

Q5. After the F^+ cell donates the F factor to the recipient cell, it is not converted into a F cell. Justify. [2M]

Q6. In *E. coli*, the three loci *Str*, *phe* and *ara* are within 2 minute map distance apart. To determine the exact order and relative distance, the prototroph (*str*⁺ *phe*⁺ *ara*⁺) was infected with a transducing phage P2. The lysate was used to infect the auxotroph (*str*⁻ *phe*⁻ *ara*⁻). The *str*⁺ classes of transductants were selected to produce the following data:

<i>str</i> ⁺	<i>str</i> ⁺	<i>str</i> ⁺	<i>str</i> ⁺
<i>phe</i> ⁻	<i>phe</i> ⁺	<i>phe</i> ⁻	<i>phe</i> ⁺
<i>ara</i> ⁻	<i>ara</i> ⁻	<i>ara</i> ⁺	<i>ara</i> ⁺
127	73	0	300

- Mention the technique used to screen the different classes of transductants. [1M]
- What is the gene order and why? [2M]
- What are the relative cotransduction frequencies between the genes? [2M]

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FIRST SEMESTER 2010-2011
TEST – I (CLOSED BOOK)

Course No.: BIOT C332
Course Title: Genetics

10.10.10

Maximum Marks: 25
Maximum Time: 50 minutes

Attempt all the questions in the given sequence

- Q1. Explain the Griffith's experiment with a neat diagram. [4M]
- Q2. Write a short note on the Terminators of prokaryotic Transcription. [4M]
- Q3. The replication of the complementary strand of DNA is discontinuous. Justify. [6M]
- Q4. Explain the events that occur at the site of origin of DNA replication. [3M]
- Q5. Give the significance of [2M]
i. Pribnow box
ii. Rho protein
- Q6. Give the roles of the transcription factors of RNA polymerase II. [3M]
- Q7. Explain the self splicing of introns in the eukaryotic RNA. [3M]

SET A

BITS, PILANI- DUBAI
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FIRST SEMESTER 20010-2011
QUIZ- II (CLOSED BOOK)

Course No.: BIOT C332 15.12.10 Maximum Marks: 07
Course Title: GENETICS Maximum Time: 20 minutes

NAME: _____ ID NO: _____

Q1. What are linkers? [1]

Q2. Mention any two techniques of DNA delivery into eukaryotic cells. [1]

Q3. Give examples of any two reporter systems of prokaryotic origin. [1]

Q4. Give the significance of RFLP. [1]

Q5. Define an inducible operon.

[1]

Q6. What is zygotic induction?

[1]

Q7. What are the two types of transpositions?

[1]

SET A

**BITS, PILANI- DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY
FIRST SEMESTER 2010-2011
QUIZ- I (CLOSED BOOK)**

Course No.: BIOT C332	03.11.10	Maximum Marks: 08
Course Title: Genetics		Maximum Time: 20 minutes

Q1. Name any two unusual Bases present in a t-RNA. [1M]

Q2. What is the role of IF3 in translation? [1M]

Q3. What is molecular mimicry? [2M]

Q4. Define: a. Mutation [1M]

b. Transition Mutation [1M]

Q5. Give any two examples of any two chemical mutagens and mention their action. [2M]